Interview Summary	Application No. 10/588,814	Applicant(s) ZANGL ET AL.	
	Examiner Vincent Q. Nguyen	Art Unit 2858	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Vincent Q. Nguyen*. (3)_____.

(2) *Jacques L. Etkowicz*. (4)_____.

Date of Interview: *07 January 2008*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *11*.

Identification of prior art discussed: *Braun et al. (US 5,038,110)*.

Agreement with respect to the claims f)☒ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *See Continuation Sheet*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

VINCENT Q. NGUYEN
PRIMARY EXAMINER

V. Nguyen

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Examiner informs Applicant that there's no Fig.12 in the drawing. It was agrreed that Applicant will send a replacement sheet (Sheet 4/4) to correct the omitting of Fig. 12. It was agreed that the examiner is authorized to amend the specification to correct the omission of Fig. 12 and to amend claim 11 to include the limitations of: "and a driver circuit for temporally controlled supplying of an AC voltage signal to the first and second transmitting electrode configurations".

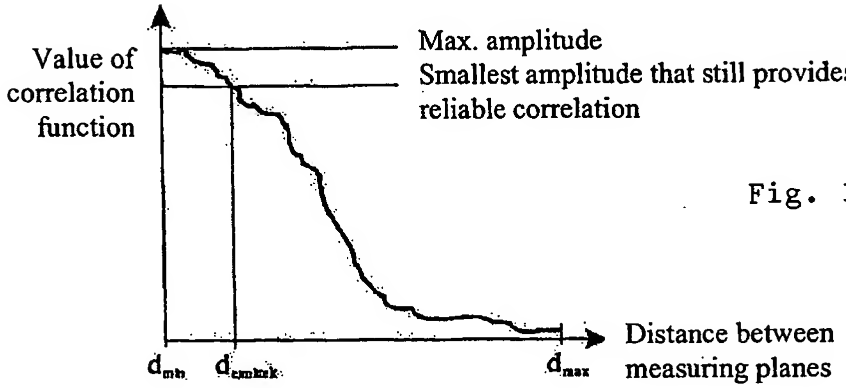

Fig. 12

Approved
V. Nguyen
01/08/2008

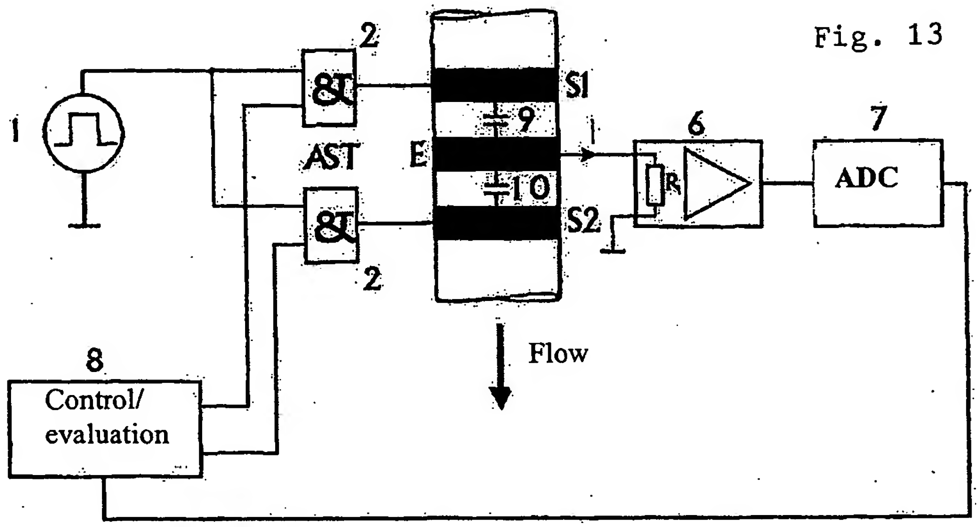

Fig. 13

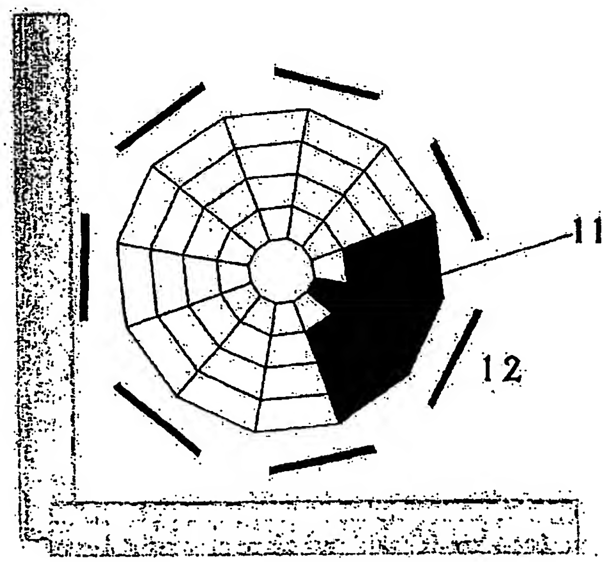

Fig. 14

Fig. 4 is an illustration similar to Fig. 2, in which the coupling capacities between the electrodes are drawn,

Figs. 5a to 5c shows a tube provided with electrodes in diagrammatic cross section with three different filling levels,

Fig. 6 is a view of a tube similar to Figs. 2 and 4,

Fig. 7 is a diagram showing two starting signals of the evaluation device,

Figs. 8a and 8b are side views of two further embodiments of electrode configurations, using which a velocity distribution profile can be determined,

Figs. 9a to 9c show, in views similar to Figs. 5a to 5c, a circular flow at different points in time,

Figs. 10a, 10b show, for example, embodiments of electrodes on a flexible insulating material,

Figs. 11a, 11b show the arrangement of a shield on a tube with electrodes, in a side view and in cross section,

~~Fig. 12 is a diagrammatic side view of the arrangement of displaceable transmitting electrodes on a tube,~~

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Fig. ~~13~~ 12 is a graph illustrating the starting signal of the evaluation circuit as a function of the adjustable electrode distance,

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Fig. ~~14~~ 13 shows, as a simplified block circuit diagram, the entire measuring configuration according to the invention,

Fig. ~~15~~ 14 is a diagrammatic cross section of that flow region in which fluctuations act strongly on a certain electrode.

In the description which now follows, Fig. 1 shows a tube of insulating material, on which there are disposed, externally, an annular receiving electrode E and two annular transmitting electrodes S1 and S2.

According to Fig. 2, each transmitting electrode is subdivided into eight individual electrodes, which according to Fig. 3a are located externally on a tube, but according to Fig. 3b are incorporated in a tube.

As can be seen from Fig. 4, the transmitting device and receiving device can in principle be interchanged, since the coupling capacities remain the same. On account of the customarily higher complexity of the receiving device in the capacitive measuring technique, however, the use of a common receiving device is recommended. The further descriptions of the invention therefore relate to this preferred embodiment having a number of transmitting devices and a common receiving device.

By means of the configuration of the electrodes described in the invention and the appropriate evaluation, good decoupling of the transmitting devices is achieved, since the field lines emanating from one transmitting terminate in the receiving without first penetrating the field of action of the second transmitting. The two transmitting devices can consequently be situated at a very short distance from one another in the direction of flow, but separated, at least, by the receiving device, without causing noticeable crosstalk. The short distance which can be achieved using the principle underlying the invention enables noninvasive measurement of the rate of transport even with streams in which fluctuations change

(connections) to the electrode surfaces can be led out to a soldering surface for a (flat ribbon) cable on the flexprint (not shown in the figures). Insulation can be applied (e.g. wrapped) around the electrode configuration, in particular the receiving electrode, for reasons of achieving insensitivity to external noise and crosstalk between the conductors leading to the receiving electrode, to which insulation an electrical shield (cf. Figs. 11a and b) is applied, e.g. a metal foil connected to a common ground). Such a shield also serves to minimize the outward radiation of electromagnetic waves from the transmitting devices.

In Xie C G, Huang S M, Hoyle B S, Thorn R, Lenn C, Snowden D and Beck M S 1992 *Electrical capacitance tomography for flow imaging - system model for development of Image reconstruction algorithms and design of primary sensors* IEE Proc. G 139 89-98, the method of back-projection is described, using which density profiles can be determined from measured data and known sensitivities. In spite of the modified electrode topology, this method is applicable both to the velocity distribution profile and the density profile.

For very turbulent streams and for very slow-moving streams, natural or artificially introduced disturbances can change greatly from one measuring plane to the next, which leads to poorer correlation of the derived signals of both planes. The nearer the two measuring planes are together, the lower the difference in the material distribution in both planes and the greater the similarity of the signals (good correlation). Because of the resulting decreased resolution of the measurement of the time difference (and thus the decreased resolution of velocity determination), one will endeavor, however, to increase this distance as far as the quality of the correlation function allows.

In order to adapt the distance between the two measuring planes to the actual stream, the variant of the invention illustrated in ~~Figs. 12 and 13~~ Fig. 12

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provides for adjustment of the distance between the electrodes as a function of the amplitude of the correlation function. The transmitting electrodes are here attached to carrier rings mounted for displacement along the tube, which can be shifted in position manually or automatically, for example by means of a spindle drive, controlled by the results of measurement.

On the assumption that the general transport conditions (e.g. parameters of the transport air supply) only change slightly during a stationary transport process, the distance between the two planes is altered from a minimum to a maximum position and for each position the correlation functions of corresponding electrodes are formed. That distance between the measuring planes at which the correlation functions (on average) still yield clearly detectable peaks, is used for the measurement of the transport properties. The relationship between the determined amplitude and the distance of a transmitting electrode from the receiving electrode is demonstrated, for example, in Fig. ~~13~~. 12

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